# REFERENCE MANUAL 83G
# VECTOR-BORNE AND ZOONOTIC DISEASES

## A. VECTOR-BORNE AND ZOONOTIC DISEASE

A.1 NPS Unit Managers will reduce the risk of transmission of vector-borne and zoonotic diseases to park visitors and employees through education, surveillance, and control efforts when necessary. Control procedures will reduce risk while minimizing adverse impact on natural and cultural resources. The NPS will follow an integrated pest management approach in addressing vector-borne disease issues as outlined in Director's Order 77.

A.2 At a minimum, parks shall establish a point of contact at the local public health and/or vector-borne disease control agency in order to keep up to date on potential and current trends in vector-borne disease prevalence in and around the park. Some parks may need to assign an individual to coordinate vector-borne disease issues based on an elevated risk and the recommendation of the regional public health consultant (PHC).

A.3 The designated park staff member responsible for addressing vector-borne and zoonotic disease issues will have the responsibility to implement the recommendations of the PHC. Whenever possible, this individual should be the park Integrated Pest Management (IPM) coordinator or the park sanitarian. The duties and responsibilities may include:

- Coordinate with local and state departments of health, PHC, and IPM program.
- Ensure educational materials are available for park staff and visitors, and conduct or coordinate preventive education and training sessions.
- Establish and maintain passive surveillance program within the park.
- Coordinate active surveillance activities within the park.

## B. DEFINITIONS

B.1 **Carrier**: a person or animal that harbors a specific infectious agent without discernible clinical disease and serves as a potential source of infection.

B.2 **Endemic**: the constant presence of a disease or infectious agent within a given geographic area; it may also refer to the usual prevalence of a given disease within such area.

B.3 **Epidemic**: the occurrence in a community or region of cases of an illness with a frequency clearly in excess of normal expectancy. The number of cases indicating the presence of an epidemic will vary depending on the infectious agent.

B.4 **Host**: a person or other living animal, including birds and arthropods, that affords subsistence or lodgment to an infectious agent under natural conditions.

B.5 **Infectious Agent**: an organism that is capable of producing infection or infectious disease.

B.6 **Infectiousness**: the relative ease with which a disease is transmitted to other hosts.

B.7 **Infectivity**: the ability of the disease agent to enter, survive and multiply in the host.

B.8 **Pandemic**: a global epidemic.

B.9 **Pathogen**: a specific causative agent of disease (such as a bacterium or virus).

B.10 **Reservoir**: any person, animal, arthropod, plant, soil or substance in which an infectious agent normally lives and multiplies, on which it depends primarily for survival, and where it reproduces itself in such a manner that it can be transmitted to a susceptible host.

B.11 **Surveillance**: The ongoing systematic collection, analysis and interpretation of health data essential to planning, implementation and evaluation of public health practice, closely integrated with timely dissemination of data to concerned parties.

a. **Active**: The systematic and comprehensive collection and evaluation of data including specimens, such as mosquitoes, in order to identify public health risks and trigger intervention.

b. **Passive**: Voluntary collection and reporting of data, such as the reporting of dead birds associated with West Nile virus or dead rodents associated with plague.

B.12 **Transmission**: any mechanism by which an infectious agent is spread from a source or reservoir to a host, including;

a. **Direct:** Essentially immediate transfer of infectious agents to a receptive portal of entry through which infection may occur [touching, biting, direct projection of droplet spray]

b. **Indirect:**

(1) Vehicle-borne [contaminated inanimate objects – needles]

(2) Vector-borne

(a) Mechanical [carrying – flies crawling on food]

(b) Biological [requires multiplication within the insect] Infectious agent must multiply before an insect can transmit the disease. This time before the insect becomes infective is known as the incubation period

B.13 **Vector**: a carrier, especially an arthropod that transfers an infective agent from one host (which can include itself) to another.

B.14 **Zoonosis**: a disease of animals transmissible to humans.

## C. SURVEILLANCE & CONTROL

C.1 At a minimum, parks shall implement a passive surveillance program for vector-borne disease. For example, rodent and bird die-offs should be reported to the PHC.

C.2 The NPS will develop agreements with federal, tribal, state, and local governments and organizations, and private landowners, when appropriate, to coordinate public health responses to vector-borne disease issues. When surveillance data from outside the park

boundary will not accurately represent the park's vector population it may be necessary to conduct surveillance within the park.

C.3 In order to protect public health it may be necessary to implement control efforts to reduce the vector population. All control efforts will be in accordance with Director's Order #77 and coordinated through the (IPM) program, and must meet all applicable NPS compliance requirements.

C.4 Park units that are experiencing an epidemic, or historically have elevated risk of disease incidence, should prepare written plans for conducting surveillance and initiating control measures. Preparation of any such plans should be based on the recommendation of the PHC, and prepared by the park in cooperation with the regional IPM coordinator, and if appropriate, the NPS Wildlife Health Program.

## D. EDUCATION

D.1 Education and training focused on prevention are the keys to protecting both visitors and employees from vector-borne and zoonotic diseases. This effort should be coordinated with the PHC and/or the local health department, and determined by the vector-borne and zoonotic disease risks in that locality and the existing knowledge base.

D.2 An individual knowledgeable in the transmission of vector-borne diseases, control methods, and risk to public health should prepare and present information to visitors and employees. Regional IPM, PHC or wildlife biologists can serve as resources in developing and presenting technical public health information.

D.3 Informative pamphlets and/or signs should be available to educate staff and visitors about potential vector-borne and zoonotic diseases in the park. These materials, available through the NPS Public Health Program as well as state and local health departments, provide general information on risk avoidance, recognition of signs and symptoms, identification of high-risk areas and when to seek medical attention.

## E. COMMON VECTOR-BORNE DISEASES

## E.1 MOSQUITO-BORNE DISEASES

### a. General Information

Mosquito-borne diseases have affected human populations since the dawn of agricultural society. Following are several diseases that may currently be encountered in the National Parks. However, the list is not representative of all sites in the National Park Service system or inclusive of all diseases that may be encountered in the future.

**Viral encephalitides** [Eastern, Lacrosse, St. Louis & Western encaphalitis]

Encephalitis is an inflammation of the brain, which can be caused by viruses transmitted through the bite of an infected mosquito. Susceptibility to clinical disease is highest in infancy and old age. With an incubation period between 5 and 15 days, mild cases result in a febrile headache while severe cases present with acute onset of high fever and headache, but most infections are asymptomatic. Case fatality rates range from 0.3% to 60% with Eastern Equine exhibiting the highest.

Each disease is caused by a specific virus, occurs in specific geographic regions, transmitted by specific species of mosquitoes and may follow certain cyclic patterns based on multiple environmental factors.

**West Nile encephalitis** is an infection of the brain caused by West Nile virus. Humans become infected through the bite of an infected mosquito and susceptibility to clinical disease is highest in infancy and old age. While the incubation period is between 3 and 12 days the majority of infections are asymptomatic. Infection by the virus leads to immunity (assumed to be life-long). Less than 1% of those infected actually develop severe illness. Case-fatality rates range from 3% to 15% in the severely ill, which are predominantly elderly.

West Nile Virus first appeared in the Western Hemisphere in 1999 and is closely related to St. Louis encephalitis. Research into the behavior of the disease in the United States is ongoing and geographic spread as well as the discovery of other vectors may occur.

**Dengue** and **Dengue Hemorrhagic Fever** are acute febrile viral diseases. There are four different dengue viruses (DEN-1, DEN-2, DEN-3, and DEN-4) that cause illness. Disease is characterized by the sudden onset of fever, severe headache, joint and muscle pain, GI disturbances, rash, and in the hemorrhagic manifestation, bleeding from multiple sites. The sporadic occurrence of shock and hemorrhage typically results in death.

Dengue is predominantly a disease of tropical urban areas and maintained in a human-*Aedes aegypti* mosquito cycle (a monkey-mosquito cycle may be important in maintaining the virus in Asia and Africa). There are an estimated 50 to 100 million cases in the world each year, and although there has not been an outbreak in the continental United States since 1945, there are approximately 200 suspected cases imported annually to the U.S. by international travelers. The majority of these imported cases occur in Florida and Texas; however, Hawaii experienced an outbreak in 2001, which was attributed to local transmission. While the incidence of dengue is low in the continental U.S. and surveillance is passive based on reported cases, Puerto Rico and the U.S. Virgin Islands have active, laboratory-based surveillance programs in place to control the increasing incidence in the Americas.

### b. Risk Reduction

Effective risk reduction for mosquito-borne diseases within the NPS requires all employees and visitors to be knowledgeable and proactive in taking necessary steps to minimize exposure. Primary risk reduction practices include eliminating man-made mosquito-breeding habitat, avoiding activities when mosquitoes are most active, and wearing long sleeved shirts and pants. Many species of mosquito breed in stagnant water, therefore, it is critical that containers such as tires, buckets, birdbaths, gutters and miscellaneous debris are either removed or not holding water. The use of an insect repellant containing DEET is effective against mosquitoes and should be used during periods of high mosquito activity. DEET should be used with caution on children – DEET is not recommended for the very young.

West Nile Virus – Information Sheet
(http://www.nps.gov/public_health/intra/info/fact_sheets/fs_wnv_gen.htm)

## E.2 PLAGUE

### a. General Information

Plague is found in the United States throughout the west, from the Pacific Coast to the western Great Plains, and from Canada southward to Mexico. Human cases in the United States are generally sporadic, acquired from wild rodents or their fleas, or direct contact with plague-infected animals. Over the ten-year period 1987-1996, there was an annual average of 10 plague cases. Untreated bubonic plague has a case fatality rate of about 50%-60%.

Plague is caused by a bacterium that is transmitted from animal to animal and from animal to human primarily by the bites of infective fleas. Disease outbreaks among rodent populations may have a high death rate, resulting in infected fleas searching out other sources of blood. Less frequently, the organism enters through a break in the skin by direct contact with tissue or body fluids of a plague-infected animal. Transmission of bubonic plague from person to person is uncommon.

The onset of bubonic plague is usually 2 to 6 days after a person is exposed. Initial signs and symptoms include fever, headache, and general illness, followed by the development of painful, swollen regional lymph nodes. Once a human is infected, a progressive and potentially fatal illness generally results unless specific antibiotic therapy is given.

Rodent populations that serve as frequent sources of human infection include Rock squirrels in southwestern states, California ground squirrels in the Pacific states, as well as prairie dogs, wood rats, chipmunks, and other ground squirrels.

### b. Risk Reduction

Plague outbreaks in wild rodent hosts throughout the western United States will continue to occur. The greatest threat in the National Parks of the west is to people living, working, or playing in areas where infection is active. Preventive measures should include:

- Eliminating food and shelter for rodents in and around homes, work places, and developed recreation areas by making buildings rodent-proof, and by removing brush, rock piles, junk, and other food sources from properties.
- Surveillance for plague activity in rodent populations by public health workers, citizens reporting rodents found sick or dead, or “windshield” surveys by biologists.
- Closure or modified use of high risk area.
- Treatment of pets (dogs and cats) for flea control.

**Plague – General Information**
(http://www.nps.gov/public_health/intra/info/fact_sheets/fs_plague.htm)

**Rodent Proofing**
(http://www.nps.gov/public_health/inter/info/general/NPS_RP_Manual_v2.pdf)

## E.3 TICKBORNE DISEASE

### a. General Information

Tickborne diseases are an important source of morbidity and, with some diseases, mortality to both park employees and the visiting public. The pathogens that cause these diseases are transmitted through the bite of infected ticks. Lyme Disease, Rocky Mountain Spotted Fever (RMSF), Human Ehrlichiosis and Babesiosis may all be transmitted through the bite of the ixodid (hard) tick. Other common tick species identified in National Parks are also capable of transmitting tickborne diseases. Among these tick species are the Dog tick and the Lone Star Tick. Persons at greatest risk of these diseases are those who work or recreate in areas where there is extended exposure to infected ticks. Activities may include hiking, camping, fishing and hunting in infected tick habitat, as well as landscaping, brush clearing, forestry and wildlife/park management. Persons who live in residential areas surrounded by woods or overgrown brush infested by vector ticks are also at risk of tickborne diseases.

**Lyme disease** is the most commonly reported vector-borne disease in the United States. The causative agent for Lyme disease is *Borellia burgdorferi*; a bacterium carried in the gut of *Ixodes scapularis* and *Ixodes pacificus* ticks.

The disease is characterized by "flu-like" symptoms during the early stages, but may progress to systemic symptoms affecting the nerves, joints and heart. In about 70% of the cases, there may be a "bulls-eye" rash (erythema migrans) at the site of the tick bite. The rash may not be present in some people, or it may occur on a part of the body that is hard to see. If present, it usually occurs 3 to 32 days (mean 7 to 10 days) after tick exposure. This rash is characteristic of both Lyme disease and STARI (see below).

Each year over 16,000 cases of Lyme disease are reported in the United States. The disease has been reported in 49 states, although the majority of cases (92%) have been reported from the states of Connecticut, Rhode Island, New York, Pennsylvania, Delaware, New Jersey, Maryland, Massachusetts, and Wisconsin.

Lyme disease is rarely, if ever, fatal and responds readily to typical antibiotic therapy if caught in the early stages.

**Rocky Mountain Spotted Fever** (RMSF) is the most common rickettsial disease reported in the United States. The disease caused by infections with the infectious agent, Rickettsia rickettsii. Transmission of the disease results from the bite of an infected tick, primarily the Rocky Mountain wood tick (*Dermacentor andersoni*) and the American dog tick (*Dermacentor variabilis*). The disease is characterized by the sudden onset of a moderate to high fever, which can persist for 2-3 weeks in untreated cases, deep muscle pain, severe headache, chills and significant malaise. A maculopapular rash may appear on the extremities in some cases.

Approximately 250-1200 cases of Rocky Mountain Spotted Fever have been reported annually in the United States. Over one-half of all cases are reported from the south-Atlantic region and 20% of cases reported from the western south-central region of the country. North Carolina and Oklahoma have the highest incidence rates, reporting approximately 35% of all cases. Nearly 50% of all cases occur in the southeastern and south-central United States.

The disease can be fatal if not treated properly. The case-fatality rate for untreated Rocky Mountain Spotted Fever ranges from 13% to 25%.

**Human Ehrlichioses** are a group of clinically similar, yet epidemiological distinct, diseases caused by *Ehrlichia* bacteria. Human disease caused by *Ehrlichia* was first identified in the United States in the mid-1980s. The diseases are characterized by rapid onset of fever, chills, general malaise, headache, muscle and joint pain, sore throat and sleeplessness. The disease may be confused with Rocky Mountain Spotted Fever, except there is usually no rash present in human ehrlichiosis cases. The incubation period for human ehrlichiosis is 7-21 days.

Two broad classes of ehrlichiosis are described in humans based on the cells the bacterium infects: Human Monocytic Ehrlichiosis (HME) and Human Granulocytic Ehrlichiosis (HGE). The causative agent for HME is *E. chaffeensis*, whereas the causative agent for HGE identical or is closely related to *E. phagocytophila* and *E. equi*.

As of 1999, health departments and other diagnostic laboratories reported over 1200 cases of human ehrlichiosis. Approximately two-thirds were cases of HME. The majority of HME cases have been reported from southern states, whereas most cases of HE have been reported from Midwestern and northeastern states.

**Babesiosis** is a potentially severe and sometimes fatal protozoan infection of red blood cells. The causative agent for most Babesiosis in the eastern and Midwestern United States is *B. microti*, while Babesia isolate type WA-1 parasites causes the majority of infections reported on the west coast. The disease is characterized by fever, chills, muscle aches, fatigue and jaundice that may last from several days to a few months.

Babesiosis is endemic on Nantucket and other islands of Massachusetts, Block Island, Shelter Island, eastern Long Island and southern Connecticut. Babesia isolate WA-1 has been reported to cause human disease in California and Washington. Co-infections with *B.burgdorferi* have been reported in the medical literature.

**Southern Tick Associated Rash Illness (STARI)**, is a recently identified borreliosis which closely resembles Lyme disease in clinical appearance has been described in the southeastern and south-central United States. The disease is caused by *Borrelia lonestari* and is vectored primarily by Amblyomma americanum, the Lone Star tick. Treatment, as well as risk reduction strategies are identical to Lyme disease.

**Tickborne paralysis** is a potentially fatal reaction to a paralyzing toxin secreted in the saliva of a female tick during the late stages of feeding. Vectors of this illness include the Rocky Mountain wood tick (*Dermacentor andersoni*), the American dog tick (*Dermacentor variabilis*), the Lone Star tick (*Amblyomma americanum*), *Amblyomma maculatum*, *Ixodes scapularis* (black-legged tick), and *Ixodes pacificus* (western black-legged tick).

Signs and symptoms of this illness include: headache, vomiting, general feeling of exhaustion and loss of motor function and reflexes. These symptoms are followed by a paralysis that starts in the lower body and spreads to the rest of the body. The paralysis can cause respiratory failure and death results in approximately 10% of cases.

The illness is most commonly found in the Rocky Mountain and northwest regions of the United States and western Canada.

**Tickborne Relapsing Fever (TBRF)** is a systemic disease in which periods of fever lasting 2-9 days alternate with periods of no fever, which last for 2-4 days. These relapses can vary from 1 to 10 or more. A rash may be present during the fever periods. The average incubation period is eight (8) days; with a range of 5-15 days. The total duration of the disease averages 13-16 days. Approximately 2% to 10% of untreated cases can result in death.

TBRF is endemic throughout much of the western United States, with sporadic cases occurring each summer and fall. The disease is caused by infection with the spirochetes *Borrelia hermsii* or *B. turicatae*. The soft ticks of the genus Ornithodoros, which transmit the illness, usually feed on rodents and frequently infest rodent nesting material. The ticks are reclusive, usually feeding at night for only 5-20 minutes. Their bites are painless and frequently go unnoticed. Humans are incidental hosts when bitten by an infected tick. Cabins in wilderness areas are attractive nesting sites for potentially infected rodents, particularly when food is made available by cabin users. Most infections are acquired by persons vacationing in mountain cabins where rodents have nested.

### b. Risk Reduction

Limiting exposure to ticks is the most effective way to reduce the likelihood of tickborne diseases. In persons exposed to tick-infested habitats, prompt careful inspection and removal of crawling or attached ticks is an important method of preventing disease. It may take several hours of attachment before organisms are transmitted from the tick to the host.

When it is unreasonable to avoid tick habitats, consider these personal protection measures:

- Wear light-colored clothing to allow you to see ticks crawling on your clothing.
- Tuck pant legs into socks so that ticks cannot crawl up the inside of your pants legs. The use of tall rubber boots may also provide additional protection.
- Apply repellants to discourage tick attachment. Repellents containing permethrin can be sprayed on boots and clothing, and will last for several days. Repellents containing DEET (n, n-diethyl-m-toluamide) can be applied to the skin, but will last only a few hours before reapplication is necessary. Use DEET with caution on children – DEET is not recommended for the very young.
- Conduct a body check upon return from potentially tick-infested areas by searching your entire body for ticks. Use a hand-held or full-length mirror to view all parts of your body.
- Remove any tick you find on your body. Parents should check their children for ticks, especially in the hair, when returning from potentially tick-infested areas.
- Additionally, ticks may be carried into the household on clothing and pets. Both should be examined carefully.

Certain other tickborne diseases may appear clinically similar to the tickborne disease mentioned above, as well as other common diseases. Therefore, prompt medical attention should be sought out for those who believe that they have been infected by any of the agents listed above.

Prevention strategies for TBRF focus on avoiding tick bites and preventing rodents from nesting in human shelters in areas where TBRF is endemic. "Rodent proofing"--structural

changes that prevent rodent access to the foundations or attics of homes and vacation cabins--reduces human contact with ticks that transmit the disease

For information on the current NPS Lyme Disease policy, refer to the Managing Risk and Public Safety Policy Bulletin located at http://elips.doi.gov/activebulletins.cfm.

Lyme – General Information
(http://www.nps.gov/public_health/intra/info/fact_sheets/fs_lyme.htm)

## F. COMMON ZOONOTIC DISEASES

## F.1 HANTAVIRUS

### a. General Information

Since the initial identification of the hantavirus pulmonary syndrome (HPS) in the Four Corners area of the Southwest United States in 1993, there have been over 300 reported cases with 37% resulting in death. Cases have been reported from 31 states with over 1/2 of the confirmed cases from outside of the original Four Corners area.

Rodents, primarily the deer mouse, carry hantaviruses that cause the HPS. Humans may contract the disease when exposed directly to the infected rodent and infective virus in saliva or excreta of infected rodents is inhaled as aerosols. The first signs of illness (especially fever and muscle aches) appear 1 to 5 weeks after exposure, followed by shortness of breath and coughing. The disease then progresses rapidly, necessitating hospitalization and often ventilation within 24 hours. There is no specific treatment or cure for HPS at this time. However, it is believed that early recognition and treatment increases the likelihood of recovery.

### b. Risk Reduction

Effective risk reduction within the NPS requires all employees and visitors to be knowledgeable and proactive in taking necessary steps to minimize exposure. Primary risk reduction practices include rodent proofing of all structures, good house keeping in homes, offices, and at campsites, and education of employees, visitors, and park partners. Preventive measures include eliminating food and shelter for rodents in and around homes, work places, and recreation areas by making buildings rodent-proof, and by removing brush, rock piles, junk, and other food sources from properties. Closure or modified use of areas or structures may also be necessary to minimize risk.

Park employees who handle rodents that are potentially infected with hantavirus should consult and follow the protocols set forth in Methods for Trapping and Sampling Small Animals for Virologic Testing (see link below). In addition, park staff that routinely works in rodent infested areas, such as IPM coordinators, archaeologists, and maintenance workers, may be at higher risk and should consult and follow the appropriate safety precautions described in Updated Recommendations for Risk Reduction (also see link below).

**Hantavirus – General Information**
(http://www.nps.gov/public_health/intra/info/fact_sheets/fs_hvgen.htm)

**Rodent Proofing**

(http://www.nps.gov/public_health/intra/vector/rpmanual.pdf)

**Hantavirus – Camping Precautions**
(http://www.nps.gov/public_health/intra/info/fact_sheets/fs_hvcamp.htm)

Updated Recommendations for Risk Reduction
MMWR July 26, 2002, Vol.51, No. RR-9
(http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5109a1.htm)

Methods for Trapping and Sampling Small Animals for Virologic Testing
Centers for Disease Control and Prevention (CDC), September 1995
(http://www.cdc.gov/ncidod/dvrd/spb/mnpages/rodentmanual.htm)

## F.2 RABIES

### a. General Information

Rabies is a viral disease most often transmitted through the bite of a rabid mammal. The vast majority of rabies cases reported each year in the United States occur in wild animals like raccoons, skunks, bats, and foxes. There are now only one or two rabies related human deaths per year in the United States, largely because thousands of people per year receive postexposure prophylaxis (PEP). Most fatalities associated with rabies are acquired from bats and occur in people that do not seek medical assistance, usually because they are unaware of their exposure

The rabies virus infects the central nervous system, causing encephalopathy and ultimately death. The incubation period in humans may vary anywhere from one week to over a year depending on the site of the bite or scratch. Early symptoms of rabies in humans are nonspecific, consisting of fever, headache, and general malaise. As the disease progresses, neurological symptoms appear and may include insomnia, anxiety, confusion, slight or partial paralysis, excitation, hallucinations, agitation, hypersalivation, difficulty swallowing, and hydrophobia. Death usually occurs within days of the onset of symptoms.

### b. Risk Reduction

Preventing exposure to rabid animals and providing pre- and post-exposure prophylaxis can prevent human cases of rabies. Domestic dogs, cats and ferrets should be kept up-to-date on vaccinations, and be under direct supervision so they do not come in contact with wild animals. Wild animals should not be handled, fed, or unintentionally attracted with open garbage cans or litter. Bats and other mammals should be prevented from entering living quarters or occupied spaces in homes, offices, schools and other similar areas, where they might come in contact with people or pets.

Pre-exposure vaccinations are recommended for persons in high-risk groups, such as veterinarians, animal handlers, and certain laboratory workers. Other persons whose activities bring them into frequent contact with rabies virus or potentially rabid bats, raccoons, skunks, cats, dogs, or other species at risk of having rabies should also be considered for preexposure prophylaxis.

After any potential exposure to a potentially rabid animal, wash the wound thoroughly with soap and water, and seek medical attention immediately. The following information should be collected if possible to assist in assessment of risk:

- The geographic location of the incident
- The type of animal that was involved
- How the exposure occurred
- The vaccination status of animal, if a pet
- Whether the animal can be safely collected and tested for rabies

**Rabies – General Information**
(http://www.nps.gov/public_health/intra/info/fact_sheets/fs_rabies.htm)

## G. FURTHER INFORMATION

### G.1 Regional Public Health Consultants
(http://www.nps.gov/public_health/intra/admin/personnel.htm)

### G.2 NPS Public Health Program
(http://www.nps.gov/public_health/intra/)

### G.3 NPS Integrated Pest Management Program
(http://www2.nature.nps.gov/nps77/ipm.new.html)

### G.4 The Center for Disease Control's Division of Vector-Borne Infectious Disease
(http://www.cdc.gov/ncidod/dvbid)

### G.5 State and Local Health Departments
(http://www.cdc.gov/mmwr/international/relres.html)